

OCEAN GALES AND STORMS, AUGUST, 1931—Continued

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN—Continued													
Independence Hall, Am. S. S.	Bordeaux	New York	47 00 N	8 48 W	Aug. 19	8 a., 19	Aug. 20	Inches 29.52	W	WSW, —	WNW	WNW, 9	WSW-WNW.
De Grasse, Fr. S. S.	Plymouth	do	44 24 N	46 15 W	do	6 p., 19	do	29.78	SW	WSW, 6	WNW	WNW, 8	WSW-WNW.
Jean Jadot, Bel. S. S.	New York	Antwerp	44 23 N	43 35 W	do	4 p., 20	Aug. 21	29.67	WNW	W, 9	N	NNW, 9	W-NNW.
Brave Coeur, Am. S. S.	New Orleans	London	38 12 N	69 24 W	Aug. 22	do	Aug. 25	29.91	NE	NE, 7	SSW	E, 8	NE-SE-SSW.
Selma City, Am. S. S.	Canal Zone	Portsmouth	38 01 N	72 18 W	do	2 p., 22	Aug. 23	29.90	NE	NE, 8	NE	NE, 8	ENE-NE.
Binnendijk, Du. S. S.	Port Said	Boston	41 29 N	28 38 W	Aug. 24	6 a., 25	Aug. 26	29.41	S	S, 8	NW	N, 9	SSE-S-N.
Cerintus, Br. S. S.	France	Port Arthur	40 36 N	27 32 W	do	9 a., 25	Aug. 26	29.40	SSE	SSW, 6	NNW	NNW, 8	SSW-NNW.
Middleham Castle, Br. S. S.	Antwerp	Corpus Christi	49 30 N	4 45 W	do	10 p., 24	Aug. 25	29.25	SE	NE, 8	NNE	E, 9	SE-NNE.
Asia, Dan. T. S.	do	Cristobal	49 30 N	5 50 W	do	—, 24	do	29.20	E	ENE, 10	NE	ENE, 10	ESE-ENE.
Do	do	do	47 05 N	21 45 W	Aug. 25	—, 25	Aug. 27	29.12	SE	SE, 5	N	N, 10	S-SE-NW.
West Harshaw, Am. S. S.	London	New Orleans	42 55 N	22 45 W	do	Noon, 25	do	29.54	S	SSW, 9	WNW	SSW, 9	S-SW.
Barbadian, Br. S. S.	Liverpool	Bermuda	44 10 N	22 42 W	do	8 p., 25	do	29.00	SE	S, 7	N	W, 10	S-W.
Hybert, Am. S. S.	Bremen	Tampa	44 45 N	22 35 W	do	10 a., 26	do	29.04	SSE	SSW, 9	NW	SSW, 9	SSE-SW-NW.
Middleham Castle, Br. S. S.	Antwerp	Corpus Christi	42 30 N	17 15 W	Aug. 26	4 p., 27	Aug. 28	29.71	SE	SW, 7	WNW	W, 8	SE-WNW.
Baron Kelvin, Br. S. S.	Swansea	Providence	50 20 N	26 52 W	do	Noon, 26	Aug. 27	29.79	E	NE, —	NNW	NE, 9	
France, Fr. S. S.	New York	Le Havre	49 10 N	22 19 W	do	6 a., 26	do	29.55	NNE	ENE, 7	E	ENE, 9	
NORTH PACIFIC OCEAN													
Liberator, Am. S. S.	Honolulu	Shanghai	30 14 N	129 25 E	Aug. 17	Noon, 17	Aug. 18	29.80	SE	SE, —	S	SE, 9	SE-S.
Tamaha, Br. S. S.	Shanghai	San Pedro	31 45 N	123 50 E	Aug. 24	4 p., 25	Aug. 27	29.30	NE	ESE, —	SW	S, 10	E-ESE.
San Diego Maru, Jap. M. S.	Yokohama	Los Angeles	43 14 N	173 40 W	Aug. 27	8 p., 27	Aug. 28	29.18	S	S, 8	WSW	SSW, 8	S-SW.
Atago Maru, Jap. M. S.	do	San Francisco	47 35 N	176 00 W	Aug. 29	2 p., 30	Aug. 31	28.91	SSE	SW, 8	W	SW, 9	
Brunswick, Pan. M. S.	Sydney, N. S. W.	Los Angeles	13 33 N	143 22 W	Aug. 30	11 p., 30	do	28.82	NE	N, 11	SE	N, 11	N-NW-W.
SOUTH PACIFIC OCEAN													
Laurel, Swed. M. S.	San Pedro	Port Lyttelton	36 50 S	177 10 W	Aug. 1	8 p., 1	Aug. 2	29.46	WNW	W, 10	WSW	W, 10	Steady.
Golden Eagle, Am. S. S.	Los Angeles	Melbourne	21 14 S	179 38 W	Aug. 4	11 p., 4	Aug. 6	29.76	SE	SE, 8	SE	SE, 9	
Do	do	do	36 46 S	162 51 E	Aug. 13	9 p., 13	Aug. 14	29.88	N	NNW, 7	NW	NNW, 8	NNW-NW.
INDIAN OCEAN													
Fairfield City, Am. S. S.	Manila	Aden	11 55 N	52 45 E	Aug. 6	4 p., 10	Aug. 10	29.56	SW	WSW, 8	SW	SW, 10	

¹ Barometer uncorrected.² Barometer reading approximate.

NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—The north Pacific anticyclone was the controlling factor of the weather during the greater part of August, 1931, over most of the eastern half of the ocean. In the Aleutian and lower Alaskan region pressure for the most part continued little affected by cyclonic influences until after the 20th. About the 22d a tendency toward lower pressures was observed in northern waters, and on the last three days of the month a deep cyclone developed, the minimum barometer reading at Dutch Harbor being 28.82 inches, on the 30th. The average pressure at this station, however, as elsewhere among the northern islands and along the American coast, was above normal for August. At Midway Island the average for the month was below normal, and thence westward to the Asiatic coast pressure generally was comparatively low, owing to the prevalence of numerous cyclonic disturbances in the Far East.

The following table gives barometric data for several island and coast stations in west longitudes, including Point Barrow on the Arctic Ocean:

TABLE 1.—Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean and adjacent waters, August, 1931, at selected stations

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	Inch	Inches		Inches	
Point Barrow ^{1,2}	29.99	+0.10	30.44	24th	29.70	13th.
Dutch Harbor ¹	29.97	+0.11	30.44	9th	28.82	30th.
St. Paul ^{1,3}	29.93	+0.15	30.28	8th	29.02	30th.
Kodiak ^{1,3}	29.92	+0.06	30.22	8th	29.08	31st.
Midway Island ¹	29.99	-0.09	30.08	10th	29.90	20th. ⁴
Honolulu ⁵	30.01	0.00	30.07	23d	29.90	16th.
Juneau ⁵	30.05	+0.03	30.23	5th	29.66	31st.
Tatoosh Island ^{5,6}	30.10	+0.10	30.27	26th	29.86	9th.
San Francisco ^{5,6}	29.95	+0.03	30.12	14th	29.77	2d.
San Diego ^{5,6}	29.92	+0.03	30.04	31st	29.77	2d.

¹ P. m. observations in averages; a. m. and p. m. in extremes.² For 29 days.³ For 30 days.⁴ And on other date or dates.⁵ A. m. and p. m. observations.⁶ Corrected to 24-hour mean.

Cyclones and gales.—The weather along the upper steamship routes during August may be described as having the inconvenience of low visibility and much fog, though few of

the dangers of high winds and accompanying rough seas. Indeed, it was not until the last decade of the month, or between the 22d and 30th, as gathered from numerous reports that winds of gale velocity actually occurred in the northern trans-Pacific latitudes. These included two days with gales of moderate force, a day with a fresh gale, and a fourth day with a wind of force 9, all occurring within the region 42° to 48° N., 175° E. to 170° W. This was during the period of revival of the Aleutian Low.

Tropical storm activity was of marked importance in the weather of Asiatic waters for the first time since the beginning of the year. A full report on the several typhoons that occurred there, prepared by the Rev. Miguel Selga, S. J., of the Philippine Weather Bureau, appears elsewhere in this issue of the REVIEW, and the storms therefore need no further description. It may be added however, that the typhoon which entered the China coast on the 9th and 10th and continued far inland, was probably mainly responsible for the heavy rains which caused the serious flood conditions in the Yangtse River near Hankow. Conditions attending the later typhoons of the 17th to 18th and the 24th to 26th served to aggravate the flood situation and increase the sufferings of the many thousands of homeless and hungry Chinese.

An intense cyclone was experienced on the 30th and 31st in the southeastern Pacific by the Panaman motor ship *Brunswick*, Capt. P. A. Yorgensen, observer A. Gratningsater, Sydney to Los Angeles. Said the observer:

The storm started August 30 with increasing NE. wind. At noon 30th in $18^{\circ} 00' N.$, $143^{\circ} 52' W.$, barometer 29.63 (approximate), wind NE., 8. During day gradually increasing wind and sea. At 10.11 p. m., in $18^{\circ} 33' N.$, $143^{\circ} 22' W.$, barometer dropped rapidly to 28.94 (approx.) and was ranging between 28.94 and 28.82 for about 15 minutes, while wind shifted N.-NW.; later rising barometer with wind shifting to W., SW., and S., and finally settling down on SE., where it blew out during next 24 hours. The maximum wind was from N., force 11. Temperature over 80° . Weather hazy with rain.

This is the fifth tropical cyclone known to form thus near and to the eastward of the Hawaiian Islands in the last 22 years.

While no cyclones occurred this August off the west coast of Mexico, a moderate northwest gale was experienced on the 15th in the Gulf of Tehuantepec during the existence of a depression in the Gulf of Honduras, and a local gale occurred on the morning of the 19th during a flurry at the mouth of the Gulf of California. During a 3-hour electrical storm on the 11th in $8^{\circ} 55' N.$, $85^{\circ} 07' W.$, the American steamship *K. R. Kingsbury* was reported "struck by lightning six or seven times."

Winds at Honolulu.—The prevailing wind direction at Honolulu was east, with northeast as next in frequency. The maximum velocity was 24 miles from the northeast on the 6th.

Fog.—Along the northern routes fog was slightly less frequent as a whole than in July, but was still a factor of great importance, since it occurred on 20 to 50 per cent of the days over much of the ocean between about 42° and 52° N., to the westward of about 150° W. The region of maximum occurrence here was south of the central and western Aleutians. Off the American coast between central California and the mouth of the Columbia River there was more fog than in the previous month, with a maximum of approximately 15 days on which it was observed to the northward of Eureka. South of San Francisco fog decreased sharply in occurrence to the central coast of Lower California, where reports of it ceased.

TYPHOONS OF AUGUST, 1931

By REV. MIGUEL SELGA, S. J.

[Weather Bureau, Manila, P. I.]

The first seven months of the year 1931 were unusually free from typhoons in the Philippines. The typhoon season having been delayed, there was in many regions a general complaint of lack of rain, which threatened to affect adversely the crop of rice. By the end of July the typhoon season had set in and the rains that in Manila had been 73 per cent below normal up to the end of July were 150 per cent above normal by the end of August.

The Pratas typhoon—July 29 to August 2, 1931.—The first certain indications of this typhoon are found in our weather maps of July 29, when the barometers began to fall gradually in the Philippines. The isobars of the 2 p. m., weather map of July 29 and the wind directions, which were northeast in northeastern Luzon, northwest in southern Luzon and Samar, westerly in southern Leyte, southern Samar and Surigao, south by west in Palau, and southeast in Yap, pointed to a center of a disturbance that was tentatively located within a hundred miles of 15° N. and 127° E.

On the afternoon of July 29 all ships were warned by radio, and Provinces of the islands were notified by telegraph that there was a depression over the Pacific three or four hundred miles east of Luzon. The barometric gradient at 6 a. m. on July 30 indicated that the center of the typhoon was to the east of Baler Bay. A convergence of cirrus toward the east-southeast observed at Basco at 6 a. m. is worth recording here. The usual drift of air at cirrus level in our latitudes is from the east and seems to act, as component force from the east, on the cirri radiated out from a typhoon center and at a considerable distance from the vortex. From an analysis of 37 former observations of cirrus directions in the front quadrants of typhoons, Mr. Leo G. Welch, S. J., of Manila Observatory, has found that in 19 cases the cirri were diverging exactly radially from the center, and in 15 cases the directions were less than 45° off from radial divergence, and that the lack of radial divergence could in every case be explained by a component force from the east. Three cases for unknown reasons are in apparent contradiction to the rule. Undoubtedly the convergence observed at Basco was due to the typhoon and could be taken as a fair precursory sign. All along the eastern coast of Luzon, as well as in Basco, the pressure had fallen 2 mm. from 6 a. m. of the 29th to 6 a. m. of the 30th. The center was plotted out to be near $16^{\circ} 30' N.$, $126^{\circ} 10' E.$, moving northwest by north. It continued in this direction until 2 p. m., when it was located at approximately $18^{\circ} 50' N.$, $125^{\circ} E.$ Here it changed its course to west-northwest, due to a high pressure center over Japan which was increasing and causing the barometers to rise even in Oshima and Shanghai. Advancing in its westerly motion, the typhoon was at 6 p. m. in the center of the Balintang Channel, between Aparri and Basco.

A cablegram was dispatched to Hong Kong at 9 p. m. on July 30 to warn the colony of the sudden and dangerous turn of the typhoon. Maintaining its west-northwesterly course, the center of the typhoon passed over the Pratas shoal at 8:30 p. m., July 31, when the barometer of Pratas Observatory registered the minimum of 740.9 mm. The wind that at 5 p. m. was blowing from the north with force 7-8 dropped to a dead calm at 7:30 p. m. and remained absolutely still for two hours until 9:30 p. m.,